

Collection 7 Level-3 Atmosphere Products (Changes & Updates)

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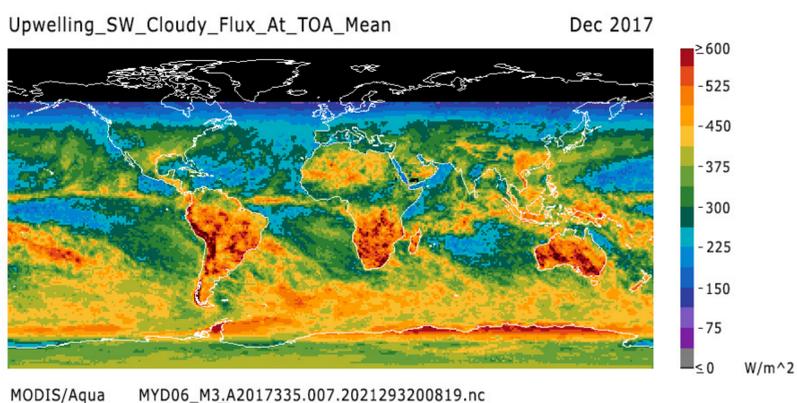
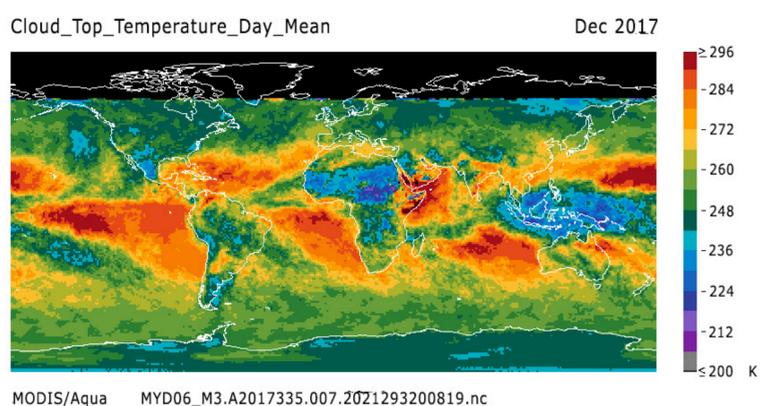
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Introduction

For Collection 7 (C7), new MODIS Standard Level-3 (L3) Atmosphere Products will be introduced. To accommodate the increased complexity of the Level-2 (L2) pixel-level products, the Atmosphere Team is moving to a new L3 processing system, namely the streamlined and flexible Yori algorithm previously developed for Atmosphere continuity dataset aggregations (e.g., CLDPROP_D3/M3) by the U. Wisconsin Atmosphere SIPS. The expected changes of this transition to Yori on the C7 MODIS Standard L3 products are summarized here.

C7 M3 Parameters produced using Yori

Two example datasets from a C7 L3 Monthly Cloud file, produced by Yori, are shown below (lower image is a new C7 dataset):

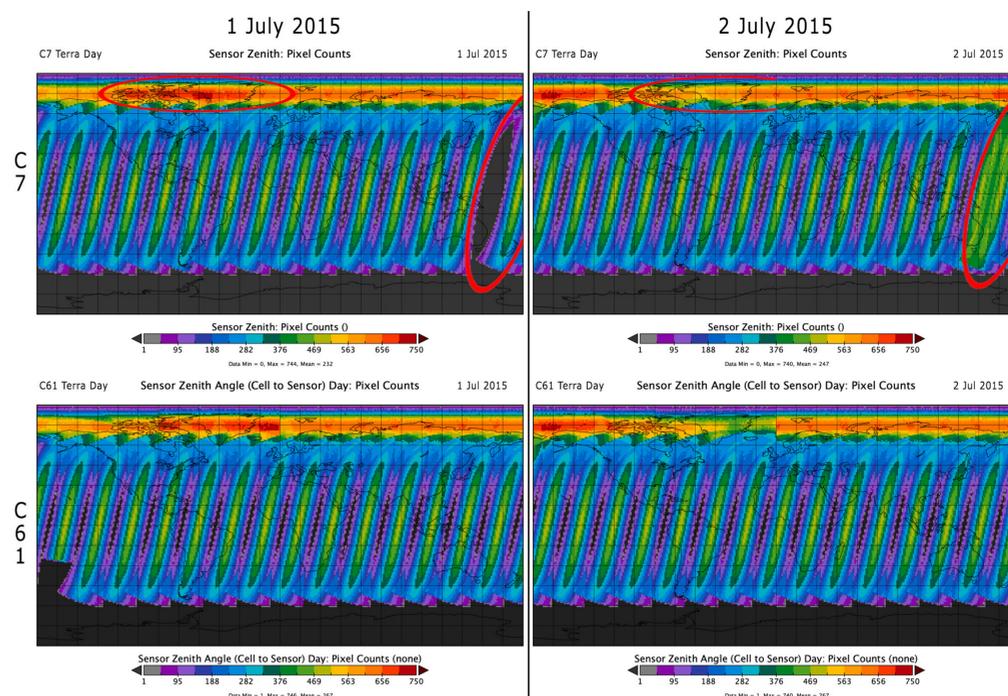


High-Level Changes in Collection 7 L3 MODIS Atmosphere

- **netCDF-4 File Format**
- **Consistent D3/M3 Content:** Both the Daily (D3) and Monthly (M3) files will include all scalar statistics and 1D/2D histogram datasets (in previous Collections, some 1D/2D histograms were omitted from the monthly files given HDF4 file size limitations).
- **New Internal File Organization:** Geophysical variable statistics (e.g., Cloud Optical Thickness Liquid mean, standard deviation, histograms, pixel counts, etc.) are now reported in groups (see below).

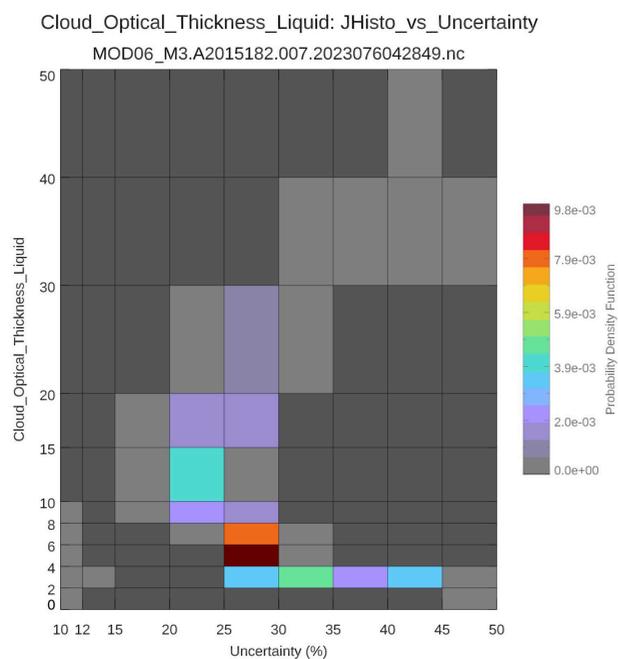
Group	Parameter	File Path
Cloud_Optical_Thickness_Liquid	Cloud_Optical_Thickness_Liquid	—
• Histogram_Counts	Cloud Optical Thickness Liquid: Histogram Counts	Geo2D
• JHisto_vs_Eff_Radius	Cloud Optical Thickness Liquid: JHisto vs Eff Radius	Geo2D
• JHisto_vs_Pressure	Cloud Optical Thickness Liquid: JHisto vs Pressure	Geo2D
• JHisto_vs_Temperature	Cloud Optical Thickness Liquid: JHisto vs Temperature	Geo2D
• JHisto_vs_Uncertainty	Cloud Optical Thickness Liquid: JHisto vs Uncertainty	Geo2D
• Mean	Cloud Optical Thickness Liquid: Mean	Geo2D
• Pixel_Counts	Cloud Optical Thickness Liquid: Pixel Counts	Geo2D
• Standard_Deviation	Cloud Optical Thickness Liquid: Standard Deviation	Geo2D
• Sum	Cloud Optical Thickness Liquid: Sum	Geo2D
• Sum_Squares	Cloud Optical Thickness Liquid: Sum Squares	Geo2D

- **Separate L3 Data Files for Each L2 Product Set:** C6.1 (and previous collection) MOD08_D3/E3/M3 combined team files replaced by separate files MOD04_D3/M3 (MOD04 Aerosols), MOD06_D3/M3 (MOD35 Cloud Mask, MOD06 Cloud-Top/Optical Properties), and MOD07_D3/M3 (MOD05 Water Vapor/MOD07 Atmospheric Profiles).
- **Definition of Day Change:** The definition of a "data day" will revert back to our Collection 5 and previous convention, namely the time period from 00:00:00 to 23:59:59 UTC. Impacts on pixel sampling (here, daytime view zenith angle pixel counts) are shown below for Terra MODIS, 1 July (left) and 2 July (right) 2015. Top row: C7. Bottom row: C61. Red ellipses show change regions.



C7 M3 Joint Histogram produced using Yori

A new tool for viewing joint histograms was recently developed by T. Arnold (cloud team). A joint histogram from one of our recent C7 Test Monthly (M3) Cloud files (Liquid Water Cloud Optical Thickness vs. Uncertainty) is shown below:



- **Updated Statistics:**
 - All means computed with pixel count weighting (previously, cloud fraction and cloud-top property means were unweighted)
 - Monthly standard deviations now defined as the standard deviation of all input L2 pixels (rather than as the mean of daily standard deviations or the standard deviation of the daily means)
- **Uncertainties Summarized in Joint Histograms:** 2D histograms vs. the primary parameters.
- **Multi-dimensional L2 Parameters are "Flattened":** Multi-band L2 parameters will be split and organized/reported as individual groups. For example, the three-band C61 parameter Aerosol_Optical_Depth_Land will become 3 separate groups in C7: Aerosol_Optical_Depth_Land_047, Aerosol_Optical_Depth_Land_055, & Aerosol_Optical_Depth_Land_066.
- **New L2 Parameter Aggregations:** New geophysical variables introduced in the C7 L2 products, e.g., MOD06 shortwave (SW) and longwave (LW) computed surface and TOA fluxes, etc., will be aggregated and reported.
- **Planned -- New Median Statistic:** Added to the Yori capabilities but still in testing.
- **Tentative -- Drop the Eight Day (E3) Product:** Dropping the E3 product for C7 is under consideration given low demand. User input on this decision is desired.